

SUBSTITUTE SPECIFICATION - MARKED-UP VERSION

~~FORMWORK METALLIC WITH ACCESSORIES FOR MOULDING CONCRETE~~

METALLIC FORMWORK SYSTEM FOR MOLDING CONCRETE

FIELD OF THE INVENTION

~~The present invention relates a formwork metallic for the molding in concrete in construction works and substructure. The invention is easy handling for uses numerous, with characteristic modular to facilitate the connection the connection between them by means accessories metallic. These formworks metallic are modules which form steel sheets with reinforcements and in size according the requirements in work.~~

~~This formworks by its vicinity them, gives the form to the concrete, specially walls and partition walls.~~

~~The formwork is made in steel sheet (2mm to 3mm thick) and the modules formed can have a weight to 43 kg (60 x 240 cm) and dimensions which varies from 5 to 80 cm in wide and 20 to 240cm in height, with increasing scales of 5 cm in the measures.~~

The present invention relates to a metallic formwork used for molding concrete in construction works and substructures. Specifically, the invention is easily operated and suitable for many uses within a modular environment that allows interconnection through a range of metallic accessories. More specifically, these metallic formworks are modules formed from steel sheets with

reinforcements having dimensions according to any desired requirements. The formworks of the present invention are selectively positioned and interconnected adjacent to each other to selectively shape concrete in walls or partition walls.

The formwork of the present invention is made from steel sheets (2mm to 3mm thick) and the modules formed therefrom can have a weight of up to 43 kg and dimensions varying from 5cm to 80cm in width and 20cm to 240cm in height, with increasing scales of 5cm among different sizes.

SUMMARY OF THE INVENTION

The metallic forwork of the present invention is a lightweight, portable and easy to use system. The basic module of the system is designed to weight not more than 25 Kg, although modules having dimensions of 240 cm X 60 cm can weight up to 43 kg and still be easily handled by any person.

According to an aspect of the invention, the metallic forwork modules provide a visible smooth finish or texture to the concrete walls.

According to another aspect of the invention, the metallic forwork modules can be built in different sizes with different measurements to provide irregular-sized modules when needed.

In accordance to a further aspect of the invention, the metallic forwork modules are manually installed without the need of expensive and heavy equipment and crane towers.

According to one aspect of the invention, the system is easily transported to the construction site due to its box-like configuration.

According to an aspect of the invention, the metallic formwork modules are designed in accordance to earthquake resistant regulations.

According to a further aspect of the invention, the system avoids unwanted waste materials and debris.

According to another aspect of the invention, the system allows controlling the use of construction tools and materials.

According to a still further aspect of the invention, the system is designed to be re-used due to its metallic construction.

In accordance to an aspect of the invention, the metallic formwork system reduce construction costs and storage space.

According to another aspect of the invention, the versatility of the system allows it to be used in residential and commercial sites.

According to one aspect of the invention, the metallic formwork modules can be easily washed and cleaned after being used.

BRIEF DESCRIPTION OF THE DRAWINGS

~~The characteristics and advantages in the formwork of the present invention appear more clearly on reading the~~

~~following description given by way of non-limiting indication and made with reference to the accompanying drawings in which~~

These and other aspects and advantages of the formwork of the present invention are more apparent from the following detailed description and claims, particularly when considered in conjunction with the accompanying drawings, in which:

~~Figure 1 presents a module metallic, basic for the formwork of the invention;~~

Figure 1 shows the basic arrangement of the metallic modules forming the formwork according to the invention;

~~Figure 2 is an accessory angular metallic shaped in L, which enables the external turn between adjacent modules;~~

Figure 2 shows an L-shaped angular metallic accessory that allows external turn between adjacent modules according to the invention;

~~Figure 3 is an accessory, or named corner cupboard-type box to enable the internal turn between adjacent modules;~~

Figure 3 shows a corner cupboard-type box accessory that allows internal turn between adjacent modules according to the invention;

~~Figure 4 (a-e) present a kit accessories metallic used in the building of formwork, which comprises: sheets, press with grips, cotter pins, distancing and arrangers, and;~~

Figure 4 (a-e) shows a plurality of metallic accessories used to assemble the formwork according to the invention;

Figure 5 shows an exemplary formwork arrangement having formwork modules in parallel according to the invention;

Figure 6 shows formwork modules in parallel separated by a distancing element according to the invention;

Figure 7 shows a formwork module aligning arrangement according to the invention;

Figure 8 shows a joining element securing adjacent formwork modules according to the invention;

Figure 9 shows a formwork module having V-shaped reinforcing metallic elements according to the invention;

Figure 10 shows a perspective view of a formwork module's back surface having V-shaped reinforcing metallic elements according to the invention;

Figure 11 shows another perspective view of a formwork module's front flat surface according to the invention; and

Figure 12 shows a fixed securing element according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

~~Figure 1 shows a formwork metallic in the invention, which comprises a frame 10 made is steel sheet 11 with shape rectangular and measures according the requirements, said sheet surrounded in its length by a metallic members longitudinal or props 12, and across the same close props~~

~~13 width-ways with the end edges connection, which has a
cuts angular (see fig. 5 detail A).~~

Figure 1 shows a metallic formwork arrangement according to
the present invention. A modular frame 10 comprises a
rectangular-shaped steel sheet 11 longitudinally surrounded
on its sides by metallic side members 12 and on its top and
bottom sides by metallic top and bottom members 13,
respectively as shown in Figure 11. Angular cuts are formed
at the corners of said modular frame 10 where an end of a
metallic side member 12 meets an end of a metallic member
13 as shown in Figures 1, 5 and 6.

~~Each member or prop 12 wich surrounds the sheet 11 has in
the length holes 14 spaced equidistant. The plane surface
sheet 10 is reinforced with metallic elements 15 with
profile in v, and in the wide has a reinforcements or
struts 16 prependiculars to previous. The module or
formwork couples or splice with others similar through an
angular profile 17 (fig. 2), which acts like a coupling
module to enable the external turn with the module adjacent
10' (see fig. 1).~~

~~The angle 17 has the same length as module 10 and comprises
holes in his faces. The modules (formworks) keeps during
installation a distance parallel with other module, where
said space enables to empty the concrete to form the wall
or partition walls in the respective building.~~

Each metallic side member 12 comprises a plurality of
equally-spaced holes 14 across its length. The modular
frame 10 is reinforced with V-shaped metallic reinforcing
elements 15 extending from the top side to the bottom side

as shown in Figure 9. It is further reinforced with struts 16 longitudinally extending from side to side and perpendicular to said V-shaped metallic reinforcing elements 15 as shown in Figures 1 and 10.

Figure 2 shows an L-shaped angular accessory 17 having an angular profile. This accessory acts as a coupling element that allows angular interconnection between external formwork modules to form concrete corners as shown in Figure 1. L-shaped accessory 17 is a metallic accessory having the same length as the formwork module 10 and also comprises a plurality of equally-spaced holes on its sides and distributed across its length.

~~Other elements to couple is the named corner cupboard module, type box 28 (fig. 3), which is a metallic frame that enables the internal turn in modules adjacent. This module 28 has a metallic wall 29 and 30, drilled to facilitate the passage of pins or sheet points, so will see therefore.~~

Figure 3 shows another metallic formwork accessory of the present invention. An internal corner element 28 comprises a box-type metallic frame that allows angular interconnection between internal formwork modules to form concrete corners as shown in Figure 1. The corner element 28 has metallic walls 29 and 30 comprising a plurality of equally-spaced holes on its surfaces and distributed across its length to facilitate passage of pins as will be shown later.

~~The coupling between adjacent modules (fig. 5) is made through an element form linkage named distancing or "tie" 18 (fig. 4c); said tie is a sheet metallic from 5 to 120 cm,~~

~~dored in its ends with holes 10 (10 mm diameter) to enable the coupling tight of an element like a hook or scoter pin 20 (fig. 4b), which presents as shaped in rod with an angular folding. This "tie" or distancing regulates the space between two modules with parallel vicinity, through a space "e" (fig. 5), filled with concrete.~~

The metallic forwork arrangement of the invention comprises formwork modules connected in parallel and having a distance e between the parallel-connected modules as shown in Figure 5, where the space provided by distance e is filled with concrete to form walls or partition walls in a building or structure. These parallel-connected modules are coupled and secured to each other by distancing elements 18 shown in Figure 4c, made of metallic sheet from 5 cm to 120 cm and having on its ends holes 10 (10 mm diamter) that allow tight passage of a rod-shaped hook or pin 20 having an angular folded end as shown in Figure 4b. As previously mentioned, this distancing element 18 selectively regulates the space between two parallel-connected modules.

~~When two modules are installed, it's proceeded to an alignment to provide vertically them and structural stiffness, through an element to align (21) (fig. 4 d), said element 21 comprises a metallic profil shape in U with variable length, which is fixed in the formwork is wide with a press with grip 22 (fig. 4 e), said press having a screw 23 with hand pushing to press the free plane of distancing against a metallic hooks or grappling iron 24, folded to enable it penetration and fixing in the holes 14 in the frame of formworks.~~

Once two modules are installed, an alignment element 21 comprising a metallic U-shaped element of variable length is provided to vertically align the modules and provide structural stability and rigidity to the same as shown in Figures 4d and 5. A U-shaped gripping press 22 shown in Figure 4e, is used to longitudinally secure said alignment element 21 against the width of said metallic formwork modules as illustrated in Figures 1 and 5. The gripping press 22 comprises a manually-rotated screw 23 structurally coupled to said press 22 and a pair of metallic hooks 24 extending away from said gripping press 22 as shown in Figure 4e. In operation, the U-shaped alignment element 21 is placed inside the U-shaped gripping press 22 and then hooks 24 are inserted into holes 14 provided on metallic side members 12. When the screw 23 is rotated, alignment element 21 is pressed against the metallic formwork modules as shown in Figures 1, 5 and 7.

~~The linkage between modules, it's complemented through linkage elements or sheets 25 (fig. 4 a) which comprises a platen 26 with a slot axial and a folding in angle and a rod welded 27 with an end folded in order to penetrate the holes in the formwork's edges.~~

~~An element placed in the corners in the module or formwork, type sure plate, welded there, enables the passage to pin 20, so to assure the distancing or "ti3" 18 to adjacent module.~~

Laterally-adjacent modules are complementary secured to each other by a linking element 25 shown in Figure 4a, comprising a rectangular metallic sheet having an axial receiving slot. The linking element 25 has an angular

folding configuration and further comprises a welded rod 27 having a folded end. When two modules are positioned side-by-side, their respective metallic side members 12 being in close proximity to each other are inserted into the axial receiving slot and rod 27 is inserted into holes 14 to secure the modules against each other as shown in Figure 8.

As shown in Figures 1, 5, 6 and 12, a locking element 40 is fixedly provided on the corners of the forwork modules for receiving and securing a pin 20 used to secure the distancing element 18 to said forwork modules. Specifically, the locking element 40 is provided with a slot for receiving and latching a folded end of said pin 20. The other end of pin 20 is simultaneously inserted into hole 19 of said distancing element 18 and hole 14 of said side member 12 as shown in Figure 6. This locking arrangement ensures that the concrete remains inside the parallel-connected formwork modules when the concrete is being molded.

~~The modules of the present invention can be installed in order the following prescriptions:~~

- ~~a) To apply the demoulding material to modules,~~
- ~~b) Star the timbering of formwork according the modulation in each work or building,~~
- ~~e) To install an fix the external linkage angle 17 to adjacent modules,~~
- ~~d) To install sheets 25 in the holes, fixing the selet of platen 26 and the point of rod 26 in said holes,~~

e) To install the distancing of tie 18, fixing the parallel modules through the hole 19 in said sheet with the scooter pin 20 on the sure plate 30 in each module's corner,

f) Adjust the element to align 21 through the press 22 of compare the verticality and alignment before to empty the concrete.

The face smooth in the formwork is coated with substance for removing the timbering before to empty the concrete, to avoid the adherence of said concrete in the formwork. This coat is washed with pressure when the empty is finished.

The stuffiness in the formwork is secured by means of cotter pins for the distancing and sheets in the holes in the frame of module. This module was making in sizes of 240cm in length and wide from 5 to 80cm. The corner eupboard has from 20 to 240cm in length at same the angles for external turn.

The weight of module according the measures selected varies from 3kg (5 x 120 cm) to 43kg (60 x 240 cm).

The metallic forwork modules of the present invention can be manually installed in accordanto to the following general steps:

1. Apply a demoulding material to the surfaces of the modules;
2. Assemble the forwork modules in accordance with the construction requirements;

3. Install and secure the L-shaped angular accessory 17 to adjacent modules as needed;
4. Install the linking elements 25 ensuring the metallic side members 12 are inserted into the axial receiving slot and that rod 27 is inserted into holes 14 to secure the modules against each other;
5. Install the distancing elements 18 to position the formwork modules in parallel by inserting one end of pin 20 into holes 19 of the distancing elements and securing the other end of the pin 20 with the locking element 40; and
6. Adjusting alignment element 21 against the formwork modules with the gripping press 22 to vertically align the modules and provide structural stability and rigidity to the same prior to pouring the concrete into the parallel-connected formwork modules arrangement.

The flat surfaces of the metallic formwork modules are coated with a demoulding material prior to pouring the concrete to prevent said concrete from adhering to said flat surfaces. The surfaces are easily pressure-washed once the concrete filling process is finished.

The rigidity and integrity of the system is ensured by the installation of pins into the appropriate holes provided for securing the distancing elements to the modules.

These modules can be made in sizes of 240 cm in height and from 5 to 80 cm in width. The internal corner modules and the L-shaped angular accessories can have lengths of from 20

to 240 cm. The formwork module's weight based on the selected dimensions can vary from 3 kg (5 X 120 cm) to 43 kg (60 X 240 cm).

Because many varying and differing embodiments maybe made within the scope of the inventive concept herein taught and because many modifications may be made in the embodiment herein detailed in accordance with the descriptive requirement of the law, it is to be understood that the details herein are to be interpreted as illustrative and not in a limiting sense.

ABSTRACT

~~The present invention relates to a formwork metallic form the molding in concrete in construction works and substructure. The invention, is easy handle for uses numerous, with characteristic modular to facilitate the connection between them by means accessories metallic. These formworks metallic are modules which form steel sheets with reinforcements and are sizes according the requirements in work. These formworks by given its vicinity the give the form to concrete especially walls flagstones and mezzanine's slabs,~~

~~The production is made in steel sheets from 2 to 3 mm of thickness and the conformed units can have a weight of up to 43 kilograms and in dimensions that vary from the 5 to 80 cm fo wide, and from the 20 to 240 cm of height, with growing scales of 5 cm among the different measures.~~

The metallic formwork system of the invention is used for concrete moulding in constructions, by virtue of a diversity of metallic accessories that allow interconnection between metallic formwork modules providing a versatile, easy-to-use and portable system.